A careful revision of the family, genera and species follows in which are described as valid the genera *Entelodon* with two species; *Archæotherium* with four species and one subspecies —including those usually grouped under the genus *Elotherium;* the subgenus *Pelonax* including three species; *Dæodon,* two species; *Dinohyus,* one species, and *Ammodon,* one species. The forms known as *Elotherium imperator* and *Elotherium superbum* can not be generically determined.

A history of the discovery and working of the famous Agate Spring Quarry follows together with geologic notes and a diagram of the Miocene section.

In discussing the cause of the deposit at Agate Spring which has rendered up so abundant and wonderfully preserved a fauna, Mr. Peterson imagines the location to have been the favorite crossing place of a stream which at times contained engulfing quicksands. The remains are those of animals which attempted to cross at the unfavorable intervals.

A detailed description of that marvelous Suilline, *Dinohyus hollandi,* is next given—a brute of rhinocerine bulk. Two restorations are given of the skeleton, one of which is an actual photograph of the mounted specimen followed by that of a model showing the possible appearance of the animal in the flesh.

In conclusion Peterson tells us that the Entelodontidæ constituted a collateral branch of the Suidæ which diverged in early Eocene time. They are nearest the pig and hippopotamus among recent forms.

In geographical distribution they are found especially in Europe and North America, none as yet having been reported from Asia. They were comparatively abundant on the flanks of the Rocky Mountains and existed also in California and New Jersey. From the Lower Oligocene upward and before the close of the Miocene they occupied certain areas from the Pacific to the Atlantic coasts of North America.

Mr. Peterson's work shows painstaking care and thought and advances our knowledge of this interesting group very materially. It is especially valuable in the clearing up of synonymies and in defining the various valid types.

RICHARD S. LULL
YALE UNIVERSITY

The Cranial Anatomy of the Mail-cheeked Fishes. EDWARD PHELPS ALLIS, JR., in Zoologica (herausg. von Professor Dr. Carl Chun), H. 57, B. 22. Stuttgart. E. Schweizerbartsche Verlagsb. 1909. Quarto, 219 pages, 8 plates.

This is another example of the painstaking descriptive work for which zoology is so greatly indebted to Mr. Allis. The work is illustrated by splendid lithographic plates after drawings by the artist Nomura from special preparations. The greater part of the paper is devoted to the descriptive anatomy of the skeleton of the head, and its chief value lies in the attention to detail in the text and the accuracy with which the figures are executed. The morphology of the myodome and the criteria of segmental relations in the cranial nerves are discussed at some length. The myodome is believed to be the homologue of the cavernous and intercavernous sinuses of the human skull.

With regard to the segmental relations of cranial nerves, Allis states that "there is a marked tendency to consider the central origin of a given cranial nerve of much more importance for the determination of its segmental position than the course of the nerve and its general relations to the skeletal elements." This he attributes to the acceptance of the neurone theory, according to which nerve fibers follow always the path of least resistance to their destination. According to this conception the points of origin of nerve components in the central nervous system give the only positive criteria as to their segmental position, and their peripheral course is explained by accident, individual experience or elective selection. The author thinks this view unfortunate and not well founded.

The reviewer has never observed the tendency of which Mr. Allis speaks. On the contrary, the segmental position of a nerve is determined primarily on the basis of its periph-

eral course and distribution. The conclusions derived from these facts may be modified by the embryonic or the phylogenetic history, which may give evidence that the nerve has reached its observed adult position through secondary shifting or change of course. The point of view is illustrated in the recognition of the ophthalmicus profundus as a separate segmental nerve in spite of its central origin in common with the trigeminus in every vertebrate. Also, in the shifting of the roots of several cranial nerves from segment to segment. Also, in the analysis of the vagus into several segmental nerves because of its peripheral relations. Also, in the recognition of a general cutaneous component in each segmental nerve, including the facialis, although all these components are commingled in a nonsegmental central nucleus. The statement made by Allis expresses a profound but not uncommon misconception of the attitude and method of students of nerve components. Without exception these workers would agree with Allis in attaching primary importance to the peripheral course and distribution of nerves, but they would not agree that this is in any way inconsistent with the neurone theory.

What has led Allis to the statement quoted above is the fact that communis fibers have not been recognized as a primary component of the trigeminus as a segmental nerve. He argues in substance as follows: in some fishes communis fibers are distributed by way of the rami of the trigeminus and, generally, cutaneous fibers run in the hyoideo-mandibular ramus of the facialis. In *Amia* and *Petromyzon* cutaneous fibers are present in the root of the facialis. Why should not both communis and cutaneous components be assigned to both trigeminus and facialis? Students of nerve components have assigned the communis fibers to the facialis and the cutaneous fibers to the trigeminus, except where they run in the *root* of the facialis, on phylogenetic grounds. In forms not provided with an operculum the cutaneous component in the hyoid segment is primitive and has its root and its ganglion cells in the facialis root and ganglion. In operculated forms (with the single exception of *Amia* so far as known) this cutaneous component in the facialis has disappeared and fibers from the trigeminus have secondarily invaded facialis territory to supply the operculum.

Similarly, in primitive forms no communis fibers have been found in the trigeminus. In fishes in which taste organs are present in the outer skin of the head, such fibers are distributed by way of the trigeminal rami, but they leave the brain in the facialis root and have their ganglion cells in the facialis ganglion. Their distribution is therefore secondary and they belong to the facialis segment. The same is true of the facialis root fibers which go to the fins, or even the tail, to supply taste buds.

It is one advantage of the neurone theory that such cases as this are explained without difficulty, while upon the Hensen hypothesis of primary continuity of nerve cell and end organ, it is inconceivable how taste organs in the skin should have secured a nerve supply at all, since the taste organs in primitive forms were wholly entodermal and the cutaneous nerves did not carry any fibers to innervate them.

J. B. JOHNSTON

SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Biological Chemistry, Vol. VII., No. 2, issued January 8, 1910, contains the following: "Effects of the Presence of Carbohydrates upon the Artificial Digestion of Casein," by N. E. Goldthwaite. The digestion of casein is retarded by the presence of carbohydrates. "The Quantitative Separation of Calcium and Magnesium in the Presence of Phosphates and Small Amounts of Iron Devised Especially for the Analysis of Foods, Urine and Feces," by Francis H. McCrudden. Description of a new method. "A Note on the Estimation of Total Sulphur in Urine," by Stanley R. Benedict. Criticism of Ritson's method. "The Fate of Sodium Benzoate in the Human Organism," by H. D. Dakin. Daily doses of 5 to 10 grams of sodium benzoate for two or three days are eliminated practically quantitatively in the urine as hippuric acid.